



Cotswold
Wildlife
Park
and
Gardens



HUSBANDRY GUIDELINES

RED-CRESTED TURACO

Tauraco erythrolophus



Compiled by

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Registrar
2007

In memory of Toni Hinckly.

Toni compiled the initial data in the Red-crested Turaco studbook whilst working at Jersey Zoo.

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SECTION 1. BIOLOGY AND FIELD DATA

A: BIOLOGY

1.1 Taxonomy

Order: Cuculiformes
Family: Musophagidae
Genus: Tauraco
Species: erythrolophus
Subspecies: None. Forms a superspecies with *Tauraco bannermani*
Common name: Red-crested Turaco

1.2 Morphology

Height: 40-43cms

Weight: 210-325g

Colouration: Crest and nape crimson; sides of neck and breast green; red wing feathers; mantle, lower back, wing-coverts golden-green.

Description: Differs from *T. bannermani* in that some of the crimson crest feathers are white-tipped, and more extended crimson on back of neck, chin and cheeks are white; bill smaller and all yellow; nostrils round not oval and covered in feathers.

Immature: Duller in colour.

Chicks: Black down.

Differences between sexes: None



1.3 Physiology

Blood analysis:

Clinical Pathology Records Report - ISIS/In-House Reference Values JERSEY ZOO - D.W.C.T

Scientific name: TAURACO ERYTHROLOPHUS

Common Name: Red-crested Turaco

		ISIS Values			In-House Values				
		Mean	S.D.	(N)	Mean	S.D.	Min.	Max.	(N)
WBC	*10 ⁹ /L	11.29	+ 4.618	(17)	5.071	+ 1.730	3.600	8.600	(7)
RBC	*10 ¹² /L	2.92	+ 0.64	(14)	2.973	+ 0.158	2.670	3.120	(7)
HGB	GM/L	145	+ 25.0	(12)	167	+ 9.90	156	179	(7)
HCT	%	45.6	+ 3.9	(19)	50.00	+ 3.11	45.00	53.00	(7)
MCH	*10 ⁹ /L	52.3	+ 5.3	(11)	56.33	+ 1.86	53.56	58.43	(7)
MCHC	gm/L	324	+ 50.0	(12)	335	+ 8.80	320	347	(7)
MCV	fL	164.4	+ 38.2	(14)	168.2	+ 5.7	159.3	176.5	(7)
HETEROPHILS	*10 ⁹ /L	4.290	+ 3.114	(17)	1.759	+ 0.575	1.080	2.842	(7)
LYMPHOCYTES	*10 ⁹ /L	5.461	+ 4.241	(17)	2.694	+ 0.715	2.072	4.128	(7)
MONOCYTES	*10 ⁹ /L	1.557	+ 1.262	(12)	0.274	+ 0.416	0.000	1.204	(7)
EOSINOPHILS	*10 ⁹ /L	0.502	+ 0.601	(8)	0.123	+ 0.325	0.000	0.860	(7)
BASOPHILS	*10 ⁹ /L	0.343	+ 0.206	(11)	0.134	+ 0.148	0.000	0.344	(7)
AZUROPHILS	*10 ⁹ /L				0.000	+ 0.000	0.000	0.000	(1)
NRBC	/100 WBC	0	+ 0	(1)					
PLATE. CNT.	*10 ¹² /L				20.0	+ 0.0	20.0	20.0	(1)
GLUCOSE	MMOL/L	16.2	+ 3.08	(11)	16.3	+ 1.75	14.7	18.8	(4)
BUN	MMOL/L	1.07	+ 0.357	(8)					
CREAT.	UMOL/L	17.7	+ 8.84	(5)	28.0	+ 20.2	15.0	58.0	(4)
URIC ACID	MMOL/L	0.431	+ 0.271	(9)	133	+ 323	0.256	972	(9)
CA	MMOL/L	2.33	+ 0.200	(11)	1.99	+ 0.218	1.67	2.28	(5)
PHOS	MMOL/L	1.23	+ 0.485	(4)	1.28	+ 0.310	1.02	1.62	(3)
NA	MMOL/L	153	+ 1	(2)					
K	MMOL/L	1.9	+ 0.3	(2)					
CL	MMOL/L	113	+ 0	(1)					
CHOL	MMOL/L	4.19	+ 0.494	(10)	4.47	+ 1.07	3.30	5.62	(4)
TRIG	MMOL/L	1.51	+ 0.352	(7)					
T.PROT. (C)	GM/L	37.0	+ 3.00	(11)	36.4	+ 3.65	31.0	42.0	(9)
ALBUMIN (C)	GM/L	16.0	+ 3.00	(4)	13.1	+ 1.14	12.0	15.1	(9)
GLOBULIN (C)	GM/L	20.0	+ 7.00	(4)	23.3	+ 3.54	18.3	30.0	(9)
AST (SGOT)	U/L	198	+ 32	(10)	201.5	+ 57.8	145.0	304.0	(6)
ALT (SGPT)	U/L	36	+ 12	(10)	24.00	+ 17.44	12.00	44.00	(3)
T. BILI.	UMOL/L	6.84	+ 3.42	(8)	8.00	+ 6.57	0.992	14.0	(3)
D. BILI.	UMOL/L	0.0	+ 0.0	(1)					
I. BILI.	UMOL/L	5.13	+ 0.0	(1)					
AMYLASE	U/L	1475	+ 0	(1)					
ALK.PHOS.	U/L	135	+ 42	(9)	114.3	+ 49.9	57.00	148.0	(3)
LDH	U/L	803	+ 731	(3)	171.0	+ 0.0	171.0	171.0	(1)
CPK	U/L	331	+ 39	(5)	370.8	+ 67.1	313.0	485.0	(5)
CO2	MMOL/L	23.0	+ 2.8	(2)					
FIBRINOGEN	G/L				1.30	+ 0.0	1.30	1.30	(2)
GGT	U/L	10	+ 9	(2)	16.00	+ 0.00	16.00	16.00	(1)
LPA	U/L	18	+ 0	(1)					
THROMBOCYTES	10 ⁹ /L				17.00	+ 3.10	13.00	22.00	(6)
TOTAL PHOS	MMOL/L				0.891	+ 0.0	0.891	0.891	(1)
UREA	MMOL/L				0.500	+ 0.000	0.500	0.500	(1)
GAMMA GLOB	GM/L	2.00	+ 0.0	(1)					

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Used by permission from ISIS and Jersey Zoo. Data from the ISIS CD: Reference Ranges for Physiological Values for Captive Wildlife, 2002 Edition.

1.4 Longevity

Wild: Unknown.

Captive: Oldest known male 27, oldest known female 21.

B: FIELD DATA

1.5 Zoogeography/Ecology

Distribution: Africa - West and Central Angola from lower Congo to Chingoroi area, and East to Malanje and upper Cuanza.

Habitat: Evergreen and riverine forests.

Population: Wild & captive.

Conservation status: CITES II. Reportedly common in forest at Gabela and N'dalatando district.

Endemic to war-torn Angola where clearance of forests presents a possible threat to numbers.

1.6 Diet and Feeding Behaviour

Very little information known on wild diet. Primarily thought to take fruit and berries.

1.7 Reproduction

Sexual maturity: Both sexes have reproduced from 1 year in captivity, but there are documented cases of both sexes producing young at 8 months of age. To date there are cases of breeding occurring up to 18 years of age. No wild data available.

Seasonality: In captivity the majority of births occur between April and October, but are recorded throughout the year. No wild data available.

Eggs/laying/clutch size: Usually 2 white eggs, laid on a flimsy platform of twigs, 1.5 – 10 meters off the ground. Eggs laid every other day.

Incubation: Incubation by both sexes, after first egg laid. Incubation period is 24 days.

Hatching: Chicks hatch with a thick coat of black down, eyes generally on the point of opening. Chick fed by parents regurgitating food into beak.

Development: Become very active from two to three weeks and will attempt to leave the nest before they can fly. Generally able to fly from four to five weeks, but will remain dependent on parents for several months after leaving the nest.

Green and red pigments generally visible between 25-30 days of age, with the red crest becoming prominent from 40-50 days. By four months of age they have full adult plumage.

1.8 Behaviour

Activity: Mainly arboreal, this species will generally only descend to the ground to drink or bathe. A large part of the day is spent feeding, broken up by short rest intervals spent preening or basking in the sun. At dusk they will return to their favourite roost.

Locomotion: Generally poor fliers, tending to move from tree to tree by gliding or with a few fast wing beats. Move short distances with a series of short hops, or by running along tree branches.

Social behaviour: They are territorial, and will generally stay in pairs throughout the year. This species has several vocalisations; the loud drawn out calls most often heard dawn and dusk and are generally territorial calls which will be responded to by neighbouring birds, and the quieter shorter vocals, possible used as contact calls and when showing excitement or aggression.

Sexual behaviour: Courtship behaviour usually begins with calling and chasing from tree to tree, followed by mutual feeding, gentle beak clapping and head bobbing. If receptive the female will lower her body allowing the male to tread her.

SECTION 2. MANAGEMENT IN CAPTIVITY

2.1 ENCLOSURE

2.1.1 Boundary

Maximum gauge of mesh to be used on aviary should be 2.5cm x 2.5cm. Although in order to prevent access to wild birds and mammals smaller gauge would be recommended. Under floor wiring will also help prevent any potential rodent problems.

Ensure that any adjoining aviaries have double mesh between them to prevent possible aggression from or towards neighbouring species.

Walls of the house should be constructed from an easy to clean material.

Roof can be either netted or meshed – ensure there are some covered areas where birds can shelter/nest from bad weather.

An enclosure access safety area should also be incorporated into the design of the aviary to prevent escapes.

2.1.2 Substrate

Bark, grass, gravel and sand are all suitable substrates for the outside aviary. A concrete/tiled floor inside the house will allow for easier cleaning.

Sand or wood shavings are ideal for using as a substrate inside the house, although ensure that there is adequate ventilation if they produce too much dust. Dust free bedding materials are also available but are generally more expensive.

2.1.3 Furnishing and Maintenance

Naturally planted aviaries offer the best environment for this species. A well-planted aviary provides cover against the elements and can also provide perching and nesting options.

By adding well thought out perching to the aviary in the form of ropes or branches you can encourage natural locomotion and activity. Turaco species tend to hop from branch to branch, or have short flights between perches and also run along branches. Perches open to the elements will allow the birds the opportunity to sun and rain bathe.

Annual re-branching is recommended for environmental stimulation and enrichment.

Being frugivores Turaco species are very messy and enclosures benefit from being cleaned regularly. Daily cleaning around feeding stations is recommended, weekly or twice weekly cleaning of outside & inside aviary should be sufficient.

2.1.4 Environment

Generally a quite hardy species as long as they are able to shelter from the elements. Access to a heated house (15 – 20 degrees centigrade) during the winter period will prevent frostbite to toes, and encourage them to maintain activity levels.

2.1.5 Dimensions

The majority of institutions hold this species in aviaries over 2 metres squared with the vast majority being in access of 6 metres squared, (usually maintained in mixed species exhibits).

Being a predominantly arboreal species there is no limit to maximum height requirements, but 2 metres should be the minimum height.

House size should be large enough to incorporate a feeding and roosting area, with enough room for easy servicing.

2.2 FEEDING

2.2.1 Basic Diet

Many presentation variations are used throughout institutions but the vast majority use the same types of ingredients. 22 institutions responded to a survey sent out in January 2007, the information below has been compiled from those answers.

Diet ingredients used by Red-crested Turaco holders (some diets used for mixed aviary species)	
Fruits	Apple, pear, grape, banana, Paw paw, tomato, pomegranate, kiwi, strawberry, blueberry, melon, mango, apricot, plum, nectarine, seasonal fruits & berries.
Vegetables	Cucumber, cauliflower, broccoli, carrot.
Greens	Lettuce, watercress, cabbage.
Commercial Diets	Mynah pellets, Nutribird pellets, Aves fruitmix, soaked dog pellets, Aves meat mix, Insectivorous diet, Witte Molen Insectivore mix, Witte Molen softfruit mix, soaked Mazuri Diet A.
Misc	Dried figs, canned peaches, sultanas, boiled eggs, brown bread, boiled vegetables.
Meat, insects	Mincemeat, mealworms, dried insects, crickets, wax moth, flour beetle.
Supplements	Nutrobal muti vit/min Produced by Vet Ark. Calcivit. SA37. Breedmax. Korvimin ZVT.

Diet supplements are used by 76% of the 22 institutions.

Live food is offered by 64% of the 22 institutions, 75% of these offered mainly mealworms. Two institutions stated that they have offered live food in the past but it was never taken, and one institution only offers live food when the birds are rearing young.

Conclusions

There is very limited data on analysis of wild diets. 86% of the 22 institutions keep their Turacos in mixed species aviaries with access to other bird species diets; understandably it is difficult to monitor both intake amount and ingredients chosen. At the present time no studies have been carried out to find the nutritional requirements of this species, as such it is difficult to recommend a specific diet, but it would be interesting to investigate further the extent to which diet might affect longevity and breeding success.

Burford diet sheet for Red-crested Turaco (per bird).



Red-crested Turaco

Diet Description (Per animal)

Feed	Qty (g)	Std. Measure	Cost
Apples	50.00		
Bananas	15.00		
Pears	50.00		
Grapes, Red or green	25.00		
Tomatoes, red ripe	15.00		
Carrots	5.00		
Watercress	12.50		
Lettuce, looseleaf	12.50		
Mealworm	2.50		
Witte Molen Softfood With Fruit	25.00		



Preparations

- Fed once daily in house, on feeding platform.
- Fruit chopped into 0.5cm squares, larger for soft fruit such as grape.
- Witte Molen Softfood sprinkled on top of feed then mixed in thoroughly
- Feeds are presented in a medium sized shallow dish, care is taken that fruit is not compressed in dish and should be mixed by hand prior to feeding.

Diet Composition / Recommendations

	Diet Amt.	Rec. Amt
% water	76.00	
% dry matter		
Ash	3.12	
Protein	11.12	
Fat	6.80	
Acid detergent fibre	2.94	
Neutral detergent fibre	4.28	
Calcium	0.08	
Phosphorus	0.08	
	<i>Ca:P ratio</i>	<i>1.01:1</i>
IU/g dry matter		
Iron	43.54	
Vitamin A	46.90	
Vitamin D3	-	
Vitamin E	IU/Kg	17.36

2.2.2 Special Dietary Requirements

Many institutions offer seasonal fruits & berries.

Two institutions increase the protein levels of the diet during the breeding season.

2.2.3 Method of Feeding

The diet should be fed off the ground, out of reach of wild rodents. The feeding area should be either inside or undercover out of direct sunlight and rain. The cover will also prevent either wild birds or aviary inhabitants from defecating on the food. The feeding area should be built from materials that are easy to keep clean.

74% of institutions feed once daily, as Turaco species have a very short digestive system it is recommended that the diet is available early in the morning, especially if the birds are raising chicks.

In hot weather fruit will begin to ferment quickly, to ensure the diet is kept as fresh as possible I would recommend offering a second feed during the warmer months.

Diet enrichment is used by 18% of institutions either in the form of whole fruits spiked on branches, live-food, or bunches of grapes hung in the aviary.

2.2.4 Water

Turacos will drink several times a day; as such access to clean water is essential. They bathe regularly for which a shallow pond is ideal. Avoid placing any ponds or bowls under perches to prevent contamination from faeces.

2.3 SOCIAL STRUCTURE

2.3.1 Basic Social Structure

Generally kept in pairs.

2.3.2 Changing Group Structure

Introducing birds is never predictable, as a general rule introduction in neutral territory is usually advisable, however, this is not always practical due to a shortage of aviary space.

Introduction of what potentially would be the most aggressive of the pair (in most cases the male) into the established territory of the least potential aggressor (generally the female) would be the next most viable option. Always ensure there is a suitable amount of cover to allow any bird being pursued to hide, and closely monitor that neither specimen is being prevented access to housing or food by the other and that neither individual is becoming unduly stressed.

Of the 22 institutions that replied to the 2007 survey 30% have introduced birds on neutral territory, of those aggression was observed during 3 separate introductions but all were considered successful introductions.

44% of institutions introduced males to an established female territory with 2 instances of aggression being observed. One introduction was a hand reared male, the female still has to be removed from the aviary from time to time due to her aggressive behaviour; this is the only mentioned case of an introduction being considered as unsuccessful.

26% of institutions have introduced females to an established male territory; no instances of aggression were mentioned.

Historically in the 1980's there were two cases of females being killed by their mates, with one death occurring during the initial introduction. This information indicates that no introduction should be considered predictable, every introduction should be planned and behaviours closely monitored.

In the event of a particularly difficult pair a softer approach can be attempted by allowing the birds to see each other from adjacent aviaries or by partitioning off part of the enclosure placing one bird either side. Once positive behaviour is observed gradual access can be allowed.

Wing clipping has also been used in the past with more aggressive Turaco species; by “slowing down” the aggressor this enables more time for the subordinate to retreat. (This technique is not recorded as being used on Red-crested Turacos).

2.3.3 Sharing Enclosure with Other Species

Many species have been mixed with Red-crested Turaco without problems. Many of these mixes are in large aviaries and in the case of one institute they are mixed with 25-30 other bird species (not listed in the table below) in a large walk-through exhibit.

Whenever mixing species for the first time always look at aviary size; is it large enough to allow species to establish their own territories? Is there adequate cover to allow specimens to get away from each other? Are there sufficient feeding stations to prevent any territorial disputes that may stop species from feeding?

During the breeding season it is essential to continually monitor for any signs of aggression; Turaco species can become aggressive when nesting, as can other species. Turaco chicks tend to leave the nest before they can fly and at this time they are very clumsy and vulnerable to attack.

Aggression has been recorded from pheasant species with chicks, becoming increasingly protective and eventually attacking a Turaco species that had co-habited happily in an aviary for years without any previous sign of aggression.

Common Name	Taxonomic name	Problems associated with mix
Puna Ibis	<i>Plegadis ridgwayi</i>	
Madagascar Teal	<i>Anas bernieri</i>	
African Pygmy Geese	<i>Nettapus auritus</i>	
Pheasants & Quails spp	Phasianidae	Aggression from Red-crested during breeding season
Peacock Pheasant spp	<i>Polyplectron</i> spp	
Rothschild's Peacock Pheasant	<i>Polyplectron inopinatum</i>	
Palawan Peacock Pheasant	<i>Polyplectron emphanum</i>	
Tragopan species	<i>Tragopan</i> spp	
Temminck's Tragopan	<i>Tragopan temminckii</i>	
Green Peafowl	<i>Pavo muticus</i>	
Congo peafowl	<i>Afropavo congensis</i>	Red-crested Turaco 20-day-old specimen attacked and killed. (Recently fledged).
Lady Amherst Pheasant	<i>Chrysolophus amherstiae</i>	
Giant wood Rail	<i>Aramides ypecaha</i>	
Stone Curlew	<i>Burhinus oedicnemus</i>	
Dove spp	Columbidae	

Common Name	Taxonomic name	Problems associated with mix
Socorro Dove	Zenaida macroura graysoni	
Mountain Witch Doves	Geotrygon versicolor	
Sheepmaker's Crowned Pigeon	Goura scheepmakeri	
Green Imperial Pigeon	Ducula aenea	Red-crested stopped pigeons from breeding
Crested Pigeons	Ocyphaps lophotes	
Pink Pigeon	Columba mayeri	
King Parrots	Alisterus amboinensis	
Moluccan Lories	Eos bornea	
Grey-headed Parrot	Paradoxornis gularis	
White-cheeked Turaco	Tauraco leucotis	
Rollers spp	Coraciidae	
Blue-bellied Roller	Coracias cyanogaster	Red-crested observed chasing nesting adults and fledgling rollers – Turacos moved from aviary.
White-fronted Bee Eaters	Ockoides bullockoides	
Speckled Mousebird	Colius striatus	
Regal Starlings	Cosmopsarus regius	
Superb Glossy Starling	Spreo superbus	
African Pied Starlings	Spreo bicolor	
Bali Mynahs	Leucopsar rothschildi	Aggression from Red-crested during breeding season
Golden breasted Mynah	Mino anais	
Yellow-bellied Laughing Thrush	Garrulax galbanus	
White-throated Laughing Thrush	Garrulax albogularis	
Black-throated Laughing Thrush	Garrulax chinensis	
Red and Yellow Barbets	Trachyphonus erythrocephalus	
Bearded Barbet	Lybius dubius	
White crowned Robin Chats	Cossypha albicapilla	
Shamas	Copsychus	
Weaver spp	Ploceidae	
Cape weaverbirds	Ploceus capensis	
Pekin Robin	Leiothrix lutea	
Bat spp		

2.4 BREEDING

2.4.1 Mating

It is important to ensure there is at least one sturdy perch in the aviary that is long enough to enable both birds to perch adjacent to each other as the male will mount the female from this position, after a series of chasing, feeding, calling and mutual head bobbing and beak clapping.

2.4.2 Egg Laying and Incubation

Turacos build very flimsy nests, providing them with an appropriate nest choice is important for success. Basket, wood or wire frames with approximate nest dimensions of 33cm x 20cm x 7.5cm. A substrate on the floor of the nest will prevent eggs from rolling or the chicks' legs from splaying; astro-turf, carpet or similar work well, but be sure to clean or replace between clutches. For added security artificial or natural foliage can be placed around the nest, take care to ensure the birds have a direct route to and from the nest.

Turacos will play at nest building and may add twigs to the nest, by providing them with nesting material you are allowing them to carry out natural behaviours.

Nest placement must be considered carefully. Too high and you will be unable to monitor the nest, too low and the turacos will not feel secure. It must be in a sheltered position from the weather and away from any keeper access doors in a position that allows the birds to view a large part of the aviary to ensure the birds have a sense of security. Once a site has been successfully used by a pair they will continue to use it for subsequent clutches, at this point it is worthwhile making it part of the routine to check the nest once daily. Turacos quickly become conditioned to this routine and over time you may be able to get close enough to slightly raise incubating birds to gain a look at the eggs or chicks, or to offer supplementary feeds if there are problems. The turacos will defend the nest by hissing and attacking with their beak, so be aware that eggs or chicks may get between your hand and the attacking beak! Do not attempt this unless you know your birds well, it takes time to build up this type of relationship, and any mistake could result in trampled eggs or chicks.

The following data has been taken from the data collected in the studbook.

Hatch seasonality (clutches)			Clutch Size		
Month	Number	Percent	Eggs per clutch	Number of clutches	Percent
January	1	0%	1	137	59%
February	0	0%	2	80	35%
March	2	1%	3	11	5%
April	13	6%	4	3	1%
May	33	14%	Out of a total of 231 clutches, mean clutch size is 1.5		
June	41	18%			
July	56	24%			
August	39	17%			
September	23	10%			
October	19	8%			
November	3	1%			
December	1	0%			

Artificial incubation – eggs should be placed in an incubator set at 37.5 degrees centigrade. Humidity should be adjusted to insure appropriate weight loss at 15%.

If your pair of Red-crested are particularly bad at incubating or rearing and you have another steady reliable pair of turacos (*Tauraco spp*), adding eggs or chicks is feasible for foster incubation/rearing.

2.4.3 Hatching

The adults generally eat the eggshell once the chicks have hatched.

If being artificially hatched, once internal pipping has started the egg should be placed in a hatcher with raised humidity. When the chick has hatched, clean the umbilical with an iodine solution, and when it has dried move it to a brooder unit.

2.4.4 Development and Care of Young

The chicks grow rapidly and by two weeks they may start to explore their surroundings. At this age turaco chicks cannot fly and may fall to the floor; by placing branches or mesh from the nest to the floor this will give the chicks access back to the nest. In mixed species exhibits this is the most dangerous time for the chicks, as they may become confused and lose their bearings or even be attacked by other species which share the enclosure. Close observation is very important at this point.

Generally the chicks are able to fly from four to five weeks, but will remain dependent on parents for several months after leaving the nest.

2.4.5 Hand-Rearing

Hand-reared turacos can go on to breed and parent rear successfully. As with all bird species, limit contact with the chick, and wherever possible always try to rear two or more chicks together which will reduce any imprinting on keepers.

There are many different Turaco hand-rearing diets including a mouse pinkie/paw paw diet and a parrot hand rearing formula. A diet that The Cotswold Wildlife Park has had great success with for various Turaco species is documented below.

Ingredients of Rearing Powder

- 200g Shredded Wheat
- 100g Avi Plus Mynah Pellets (Rob Harvey)
- 33g Nectar Mix (Haiths)
- 7.4g Nutrobal

Take all components and grind together until a very fine powder.

Basic diet:

First 24 hours – Wait for at least 6 hours after hatching. Then offer 5ml of distilled water with a pinch of Avipro chick starter, give this every 2 hours. All feeding is carried out between 7.00am and 10.00pm.

Day 2 Diet ratio - 5% Rearing Powder, 20% Banana, 75% Distilled water, 1 pinch of paediatric. 7 feeds per day, every 2 hours.

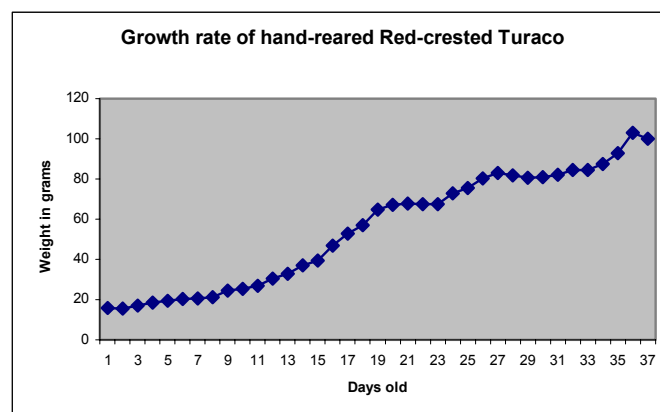
Day 3 to 9 Diet ratio – 10% Rearing Powder, 40% Banana, 50% Distilled water. Continue feeding every 2 hours.

Day 9 onwards – Gradually reduce mixture and increase fruit.

Day 6 onwards – Start to introduce in small amounts different types of soft fruit and greens; this is in preparation for the change in diet from day 9/10 onwards.

When making the mix, pass Banana through syringe before drawing up full mixture.

Diet is fed via syringe a little at a time; take care the chick does not aspirate. Warm diet through slightly before feeding. Feed no more than 10% of the chick's bodyweight per feed. Defecation can be stimulated, by gentle palpation of cloaca.



Below is an alternative hand rearing diet used by David Jones, Chairman of the International Turaco Society. David has had countless successes using the diet below on a variety of turaco species and has generously given his permission for the diet to be printed here.

Hand-rearing Diet - May 2007

The following makes a 0.5 lb jam jar of food (approximate amounts):

- Pawpaw – 25 g finely grated.
- Banana – half a large banana, mashed.
- Grapes (black and/or green) – 3 chopped / mashed
- Mixed fruit and lettuce mix – my adult turaco diet (see below) – 0.75 heaped table spoonfuls – chopped / mashed
- Cuttlefish – sprinkle – powdered
- Nutribird A21 (Versele-laga) – 2.5 heaped teaspoons

This is all mashed together with no extra water to make a very stiff mix. It should be stored in the fridge and used within a few days.

When feeding chicks, the amount needed is put into a warmed bowl and hot water is added and mixed in well. It is kept warm by sitting the bowl in a bigger bowl full of hot water.

If feeding day old chicks the mix needs to be very thin and watery and is fed via a syringe. The mix needs to be gradually less fluid as the chicks grow, so that by the time they are about 10 days old, they can be fed with a 2.5 ml plastic spoon.

Apart from the amount of hot water added to the mix, no other change is made for chicks of any age, until they start to feed themselves from a small bowl of finely chopped fruit, with A21 sprinkled over the top of it.

Adult diet

Adjust depending on how many birds you are feeding. The following feeds about 10 adult turacos:

All mixed together (approximate amounts).

- 150 grams (total) dry mix, in equal parts, of Orlux low iron softbill diet, Haiths Prosecto, poultry high protein chick crumb, poultry layers pellets, Nutribird T16.
- A third of a large carrot.
- 12.5 grams mild cheese (grated).
- Just over half a hard-boiled bantam egg.
- Quarter of an iceberg lettuce (finely chopped).
- 5 apples.
- 1.25 pears.
- 6 grapes.
- 5 bananas.
- 1 tomato.
- A third of an orange.

All diced into 0.75 cm cubes

2.5 POPULATION MANAGEMENT

2.5.1 Population Status

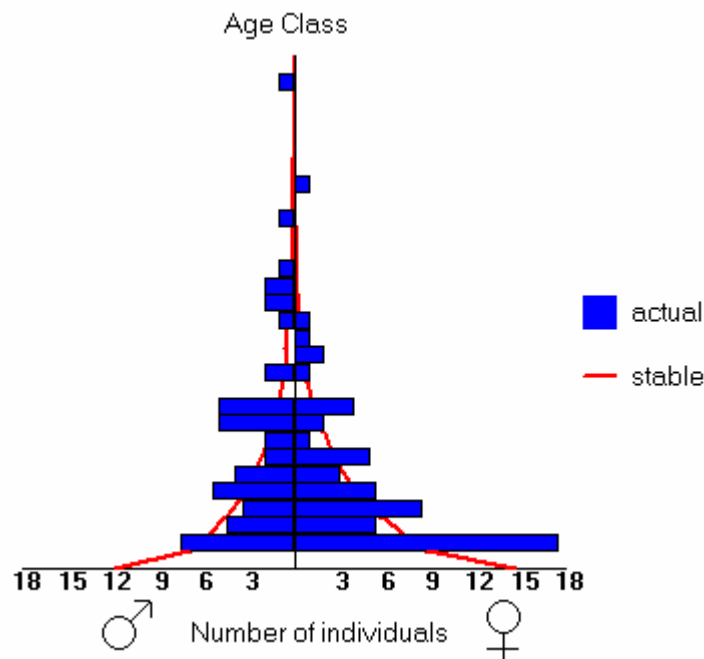
As of 31/12/06 there are 35 institutions holding 110 (46.56.8) specimens, all represented in the studbook. Overall the population is growing, with more holders and breeding success.

Gene Diversity = 0.7838

Mean Kinship = 0.2162

Mean inbreeding = 0.1140

Age Pyramid



2.5.2 Individual Identification and Sexing

This species is not sexually dimorphic; the only ways positively to sex this species are via non-invasive DNA sexing, either through toenail clippings or from feathers (the option frequently used), or through surgical sexing. Remember that no method is 100% accurate.

Identifiers used are microchips inserted under the skin in the breast area, and/or leg rings. Closed rings can be placed on the chicks at approximately 3 weeks of age. Alternatively split plastic or metal rings can be used and fitted at any age.

2.6 HANDLING

2.6.1 General Handling

As with all bird species care must be taken whenever handling a turaco. A firm grip with two hands is recommended; they will struggle but take care not to hold too tightly.



As pictured, hold the wings firmly to the body of the turaco. When stressed turacos will regurgitate food, do not obstruct the beak or hold the bird on its back, if the bird is not able to expel the food material there is a risk of asphyxia.

Many thanks to Tori a visually impaired turaco who kindly modelled this procedure.

2.6.2 Catching/Restraining

Catching turacos in a small enclosure is best done using soft catching nets, as turacos are quite clumsy fliers they are relatively easy to predict and catch mid-flight. This is less stressful/traumatic than attempting to catch against a wall of an enclosure.

In a large mixed exhibit a catching cage can be used. By placing food inside a cage close to the normal feeding station, birds can be encouraged to enter, using a pulley system the door can be closed from a distance by a patiently waiting keeper. This can take time to achieve, but if the cage is a permanent fixture the birds will become conditioned to entering the cage, making the process more routine and quicker.

Anaesthetic protocol – Same as for other bird species. Careful manual restraint of the bird, using a mask and membrane attachment to the anaesthetic circuit. 2 litres/min oxygen flow with either isoflurane (4-5%) or sevoflurane (8%) induction. After induction, if the procedure is likely to be more than a few minutes, routine endotracheal intubation is carried out. Maintenance of anaesthesia is isoflurane (1-3%). On recovery, volatile anaesthetic agent is switched off and pure oxygen maintained until recovery.

A short interval of fasting is recommended before any anaesthetic, this will reduce the risk of inhalation of regurgitated food, a 4 hour fasting period should be sufficient.

2.6.3 Transportation

For short journeys (in-house moves from aviary to aviary) a sky kennel or cardboard box can be used. Cover the container to keep the bird in the dark, but ensure there is still adequate ventilation (especially important in hot weather). Do not place the container in any draughts. Always crate individuals separately as stressed birds can become aggressive.

For longer car journeys follow the above routines but also place a perch in the crate. Foam attached to the roof of the crate will prevent any damage to the head if the bird panics and newspaper can be used as a substrate for the floor of the crate. If travelling in hot weather make sure that the vehicle is air conditioned. Food and water must be provided if the journey time exceeds 12 hours.

For journeys by air the IATA Live Animal Regulations must be adhered to. In the 31st edition container 11E (pages 176-183) is required.

2.6.4 Safety

As with all bird species there are risks of zoonotic diseases, to date I have no information of an instance of this relating to Red-crested Turacos, and with good working practices and protocols any risks can be dramatically reduced. Good hygiene regimes should be practised in enclosures along with thorough personal hygiene routines. Routine faecal screening of birds can pre-empt any health issues.

Hand reared birds when placed back into an aviary situation and paired can become quite aggressive towards keepers, flying at and brushing against keeper's faces. Take extra care when working around these birds and protect your eyes.

2.7 HEALTH & WELFARE

Parasites

Red-crested Turacos do not appear to have many problems with internal parasites. As it is difficult regularly to examine individuals especially in large mixed aviaries, twice annual precautionary de-worming treatments are advised and can be carried out in conjunction with faeces parasitology screening; this way you can reduce the occurrence of any potential problems. I would recommend that treatments are given before and after the main breeding season.

Various de-wormers are available, at Cotswold Wildlife Park we rotate the product we use every two years. We are currently using Panacur 2.5% (Fenbendazole 25mg/ml) administered at a dose rate of 1.25ml to 500g of feed, the Panacur is mixed with 10ml of warm water, and then added to the bird's diet. The amount is repeated daily for a six day course. Alternatively it can be administered as a one off dose 0.5ml to 250g bodyweight Panacur 2.5%, given orally.

Yersiniosis or *Yersinia pseudotuberculosis* infection has been responsible for several Red-crested Turaco deaths. This infection is spread through the faeces of rodents and wild birds contaminating food and water.

Symptoms include dehydration, lethargy, diarrhoea, laboured breathing, weight loss, resulting in death which can occur quite rapidly giving little chance for treatment to be administered or enough time for them to work. If symptoms are noticed early enough treatment with antibiotics can be effective, however prevention through good husbandry practice is the best course of action. Always ensure that food and water dishes are under cover and off of the floor out of reach of rodents. Wherever possible when building new aviaries, design them to keep out wild birds and rodents.

Yersiniosis is a zoonosis, so take extra personal hygiene precautions around birds and aviaries that you suspect as having this infection.

Egg binding has been the cause of several deaths with this species. The difficulty is identifying the problem especially in large mixed species aviaries as you may not always be aware of where birds are nesting.

There are multiple causes of egg binding; a malformed or large egg, if the bird is in poor physical condition caused by illness, stress, calcium deficiency, or over-weight. To treat the bird place in a dark, quiet, warm and humid area, if the egg has not been passed after a few hours seek veterinary help, they may be able to remove the egg by gentle massage and lubrication.

Metabolic bone disease/splayed legs.

Metabolic bone disease (MBD) is a category heading for a variety of disorders; rickets, osteoporosis, hypocalcaemia etc. It is a serious disease that results in severe crippling or death and is caused primarily by a diet deficient in calcium. It can, and has, affected turaco chicks.

MBD can occur in both parent reared and artificially reared turacos. In the past it was much more prevalent in hand-reared birds, but since the demise of the paw-paw / pinkie hand-rearing diet it is less widespread. Pinkies are low in calcium and high in protein, resulting in rapid growth of chicks without the adequate levels of calcium needed for proper bone development.

There are still occasional problems with leg splaying in turaco chicks, and if not identified early can result in fatalities. This is preventable in most cases by ensuring that the correct substrates are used to line the nests, both with parent and artificially reared chicks. Avoid items which can potentially

trap their legs and excessively slippery surfaces on which they cannot gain a purchase. For parent-reared chicks pieces of carpet can be used to line the nests, this should be discarded after each clutch and the nest re-lined with fresh material. Astro-turf has recently been used for our hand-reared chicks with great success. This is an easy material to keep clean and offers the chick much better purchase.

Another difficulty is over-feeding when hand-rearing chicks; turacos do not have a crop so visually it is difficult to judge the correct amounts to feed, it is always wise to weigh feeds out to avoid over-feeding and growth spurts.

Obviously in the case of parent-reared chicks we have much less control over what happens to them. Having said that, leg deformities with parent-reared turacos are infrequent. It is difficult to monitor what the chicks are being fed and even more so in a mixed aviary situation where multiple food items are available. Whether this is as a result of inexperienced birds or weak chicks remains to be seen.

2.8 CONTACT ADDRESSES

Diets

Aves fruitmix/meatmix website www.avesproduct.com

Haiths (Bugie Protein) website www.haiths.com

J E Haith Ltd,
65 Park Street, Cleethorpes,
North East Lincolnshire
DN35 7NF
Fax: 01472 242883
Email: enquiries@haiths.com

Nutribird products website www.nutribird.nl

UK supplier www.dietecuk.com
Dietec UK
53 Southlands Grove
Newby
Scarborough
North Yorkshire
YO12 5PH
Tel - 01723 379201
E-mail - sales@dietecuk.com

Witte Molen products website www.witemolen.com various agents across Europe.

UK supplier Rob Harvey Specialist feeds website www.robharvey.com

Diet Supplements

VET ARK (suppliers of Nutobal supplement) website www.vetark.co.uk

VETARK PROFESSIONAL,
PO Box 60,
Winchester, SO23 9XN. England
Tel: 44 (0)870-243-0384 Fax: 44 (0)870-243-0382
To purchase product online go to www.noahs-cupboard.co.uk

SA37 Powder Multi-Vitamin & Mineral supplement, available from www.vetuk.co.uk or contact manufacturer Intervet on www.intervet.com

Breedmax supplement, website www.breedmax.com.

DNA Feather Sexing

AVIAN BIOTECH website www.avitronics.co.uk
PO Box 107, Truro, Cornwall, TR1 2YR England
Tel: (44) 01872 262737, Fax: (44) 01872 262737
info@avianbiotech.co.uk

IATA Live Animals Regulations.

Available from Freight Merchandising Services, website www.fmslondon.co.uk
Unit 19, Shield Road,
Ashford Industrial Estate,
Ashford, Middlesex. TW15 1AU
England
Tel: 01784 240840 Fax: 01784 248615

International Turaco Society

Website www.turacos.org
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2.9 RECOMMENDED RESEARCH

Research into effects of diet on breeding and longevity.

Does an increase in dietary protein levels during breeding have a positive effect?

Do mixed species aviaries affect breeding results?

SECTION 3. REFERENCES

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Touraco Tag Husbandry Manual. Trey Todd, Houston Zoo.1998.

Veterinary Technology website www1.brcc.edu/vettech/birddis.htm